



Microwaving metal sparks interest of small businesses and universities; NNSA conference displays future technologies; Launching digital radiography roadmap; Y-12 machining capabilities grow; Y-12 advances diskless technology

Science and Technology

MICROWAVE MELTING IS A HOT TECHNOLOGY

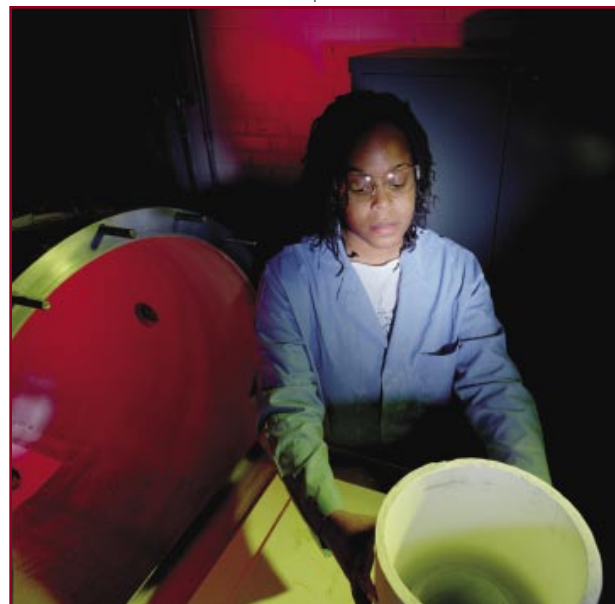
Groups ranging from small local and regional businesses and universities to a German technical university are joining forces to advance the Y-12-invented process of metal microwaving. They hope to revolutionize the automotive, medical and aerospace industries by improving the quality of the metal they use.

Last November, Y-12 signed a mentor-protégé agreement with MS Technology Inc. after licensing the Oak Ridge firm to use the technology. The agreement is part of a competitive-bid DOE program to build businesses and technology skills to achieve the overall NNSA mission.

"The small company setting enables Y-12 to advance the technology faster," said MSTI president Harbans Singla. MSTI draws on Y-12's business and technical expertise.

Microwave Technology Inc. a Y-12 licensee in Chattanooga, has a large industrial microwave and also is working with Y-12 to further develop the technology for both government and commercial applications. Rep. Zach Wamp has recognized MTI for its efforts to develop a new industry in the community.

Compared with traditional methods, microwave melting is cleaner, safer, more energy efficient, more precise in temperature control and more compact. Microwaving produces a higher quality product, can reach higher temperatures and can also melt exotic materials.



Dametria Douglas of Technology Development places some insulation into the prototype microwave unit in Y-12's microwave research and development facility.

MSTI's prototype microwave processing facility, established to advance the technology and showcase it to potential private-sector clients, was installed and operating in four weeks. Summer interns, guided by their Y-12 mentor Alan Moore and MSTI super-

visors Mike Hylton and Ken Givens, were involved in implementing the production-scale prototype unit and its state-of-the-art data acquisition and control system.

Jonathan Thomas, a Tuskegee sophomore in mechanical engineering; Yashica Hunt, a graduate

Both Thomas' and Henkel's fathers work at Y-12.

Future plans include a Microwaving Center of Excellence—a consortium of BWXT Y-12, business partners and universities located in the Tennessee corridor.

FUTURE TECHNOLOGIES CONFERENCE A 'BIG HIT'

Y-12's Applied Technologies manager Kevin Finney, who helped plan the initial NNSA Future Technologies Conference, held in Washington, D.C., last May, will chair the planning committee for the 2005 event. Y-12 will organize the poster sessions.

"The conference was a big hit and a significant accomplishment for NNSA," said Finney, who, along with Mike Monnett (recently named manager of Y-12 Public Affairs and Communications), organized the poster sessions. Sixteen of the 67 posters displayed were from Y-12. The posters featured partnering and technology transfer initiatives aimed at meeting future weapons complex needs.

The 250 attendees represented site offices, contractors, federal agencies, the United Kingdom's Atomic Weapons Establishment, universities and industry. Thirty were Y-12

employees, 20 of whom were presenters, session chairs and coordinators.

Besides panel sessions and lunch speakers, 76 technical presentations were wedged into just over two days. Y-12's topics ranged from noncontact dimensional inspection to wireless communication challenges and improvements in gas sampling and analysis.

DIGITAL RADIOGRAPHY ROADMAP LAUNCHED

Dr. David Crandall, NNSA Assistant Deputy Administrator for Research, Develop-

ment and Simulation, visited Y-12 on June 24 to give the keynote for the Digital Radiography Workshop and roadmapping effort. Attendees represented all the design agencies and production sites. The roadmap will focus resources and prioritize activities to address a wide range of technical and scientific issues.

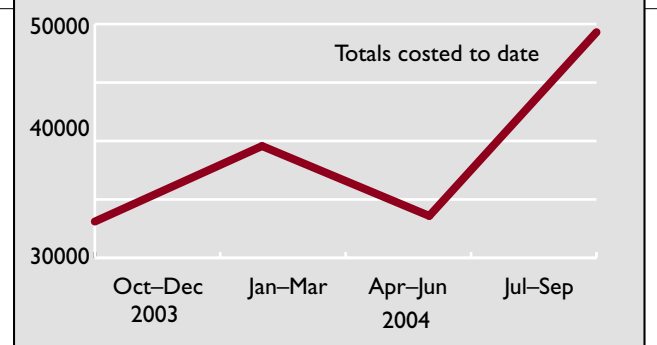
Describing the Stockpile Stewardship Program mission as "ensuring that the nation's stockpile of nuclear weapons is safe, reliable and secure without recourse to underground testing," Cran-



Art Miller (front) of Technology Development and Mark Hopkins of Quality Assurance help make Y-12 an NWC leader in digital radiography.

Campaigns and DSW Technology Investment

October 2003–September 2004



Technology development and deployment efforts continue to expand Y-12 capabilities, ensuring agility and responsiveness to NNSA and national needs.

dall said that achieving it will require the "best people with the right equipment, tools and knowledge." He showed support for digital radiography and teleradiography, by announcing joint sponsorship of a \$5.4 million project to pilot a teleradiography capability.

Attendees reached a consensus on the key aspects of a draft charter and the need to establish NWC-wide "use of digital radiography to achieve process control, surveillance, decision analysis, support of significant finding investigations and certification of weapon components."

Terry Olberding of NNSA's Y-12 Site Office said "Y-12 did a really nice job of pulling the workshop together." The second meeting of the roadmapping team was held in

Albuquerque the first week of August with a third meeting at the Savannah River Site in early September.

FACES OF Y-12
Candice Fraker
Secretary

The next generation will bring enthusiasm and a fresh, open perspective to our work and missions. Its members are eager to learn from the current generation and have a willingness to get involved and learn about Y-12, its processes and its people.





New machining capabilities will save money; Diskless factory floor enhances security, cost effectiveness; Moisture blending is popular

Science and Technology

NEW CAPABILITIES FROM NEW TECHNOLOGIES

Y-12 is gaining capabilities from the new technologies being developed and deployed to support the stockpile stewardship mission.

Campaigns and Applied Technologies are working with DSW, Manufacturing and Engineering to identify, investigate, pilot and deploy technologies to help Y-12 meet its near-term needs and reshape its capabilities to address an ever-increasing range of national security needs.

In addition to the Henri Liné high-speed gantry mill (pictured in our last issue), new machine tools now in active production include

- SIP jig borer,
- Okuma multiaxis lathe and mill,
- Hardinge multiaxis lathe,
- centerless grinder and
- Charmilles electro discharge machine.

Productivity improvements include elimination of many single-purpose machine tools. Previously, production required that material be moved from one machine to another to cut a specific feature or contour. Now, it can all be done on one machine.

Phillip Jacobs of Engineering notes that “we are currently running a job on

the gantry mill that required approximately 2,700 hours from start to finish (including a variety of non-machining tasks) the last time it was built. Using the gantry mill and the Okuma, we expect to cut that down to 750 to 1,000 hours.”

A DISKLESS FACTORY FLOOR

Y-12’s implementation of diskless computing technology is among the most aggressive in the NWC. Recognizing the security benefits of central server-based networked computing, Y-12 is expanding

deployment of diskless clients into the production environment as well as for classified scientific and engineering activities. More than 550 thin clients have been deployed (see chart on page 6).

Benefits include greater operational efficiencies, improved cyber security and more rigorous configuration control on the factory floor and in the office.

Eliminating local classified removable media is achieved by providing users with remote virtual drives located in approved classified computing centers where

data storage is under rigorous configuration control.

In late 2003, the diskless capability was demonstrated with a vibration analysis gauge. In conjunction with private-sector partners, VentureCom and M&P International, Y-12 captured data from and distributed programming to the gauge using a networked server as both data repository and host for the production software. Since then, additional pieces of inspection equipment, including a coordinate measuring machine, have been equipped and tested successfully.

Curt Holmes, of Applied Technologies’ Technical Computing Department says, “Eliminating classified removable media enhances the security of operations and data, and will provide significant cost savings and avoidances. These include eliminating plant-wide distributed inventories, reducing accountable CREM, reducing the cost of storing and retrieving removable media and streamlining configuration management.”

Y-12 also is a key site in an NWC proposal to pursue a multi-site thick client test bed being considered for joint funding by NNSA’s Cyber Security and Readiness Campaign in FY 2005 and FY 2006.



Jimmy Ward, a 33-year employee, operates a SIP jig borer, one of the new machine tools being deployed to improve Y-12’s manufacturing capability and overall responsiveness to NNSA needs.

MOISTURE BLENDING IS MAKING A SPLASH

A controlled moisture blending system, a patented device invented by Technology Development engineer Rusty Hallman, is steadily drawing interest across the NWC and even overseas.

Hallman, who credits his success as a fledgling inventor to a lifelong fondness for machines, designed the system to introduce a precise amount of moisture vapor into a gas stream.

To calibrate a hygrometer, an instrument that detects

moisture in a gas stream, “you need gases with known amounts of moisture at various levels to test the instrument to see if it’s reading and if the readings are valid,” Hallman explained. The system’s preci-

sion could benefit any activity (from the electronic to the pharmaceutical industry) requiring extremely low levels of verifiable moisture content.

Y-12 is testing the device for use as a plant-wide field calibration instrument. LANL and the Kansas City Plant use it in their corrosion studies, and the U.K.’s AWE and U.S. manufacturers are scrutinizing its capabilities. In a traditional system, the gas controller and moisture controller are separate. According to Hallman, “You have to control the ratio of two incoming streams.”

Hallman went counter-current to conventional engineering methods to devise a unit to deliver a trace amount of gas and provide superior control of the moisture being added because “that’s where novel discoveries are found—orthodoxy breeds dogma.” Additional disclosures have been submitted.

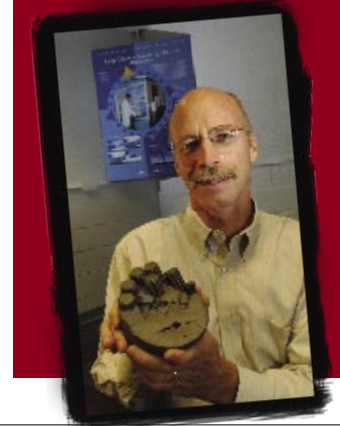


Mike Davenport, a machinist in General Manufacturing Production, operates one of the recently deployed Okuma multiaxis machine tools.

FACES OF Y-12

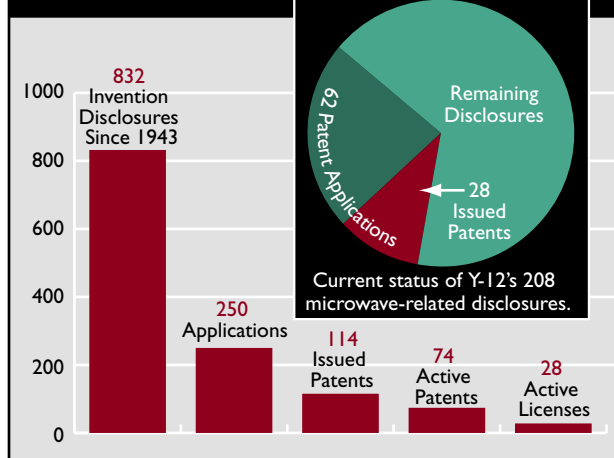
Chris Clark
Manager, Technology
Deployment

Y-12’s next generation will understand that facilities, equipment, processes and methods of communication need to continually evolve to remain competitive. Personal success at Y-12 requires a high level of patience and persistence to accomplish tasks because of the constraints required to safely work with nuclear materials.



Sixty Years of Inventions

Patents at Y-12



Y-12 scientists and engineers have averaged 13 invention disclosures annually since 1943. Of the 832 disclosures filed, 25% (208) relate to microwave technologies.